

AUSTRALIAN RECENT AND TERTIARY MOLLUSCA

FAMILY VOLUTIDAE

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Plates xiii-xvi.

INTRODUCTION

In this paper an attempt is made to place the numerous species of Recent and Tertiary Volutes in their correct genera. Most of them were originally described under the generic name *Volula*, but since then other genera have been introduced which show the relationships of the different groups of species and help to explain their origin. An extensive range of material examined by me in connection with work at the Department of Mines, South Australia, has enabled many problems to be solved. The protoconch type is used as the principal basis of classification, supported by general features of the shell, with due consideration of its ancestry. The primitive sculpture was probably of the kind found in the new genus *Austrovoluta* introduced in this paper. It consists of spiral, spaced incisions, and sharp, spaced axial ribs. In Recent genera the spirals are still found in *Fulgoraria* which also has another primitive feature, that of the shallow anterior notch. The development of the axial ribs frequently varies in specimens of the one species and may be strongly developed only in the last whorl.

In *Adelomelon magellanica* the early part of the protoconch is horny. The primitive protoconch was probably small and shelly, but Tertiary and Recent Australian species have many comparatively large protoconchs, the maximum in size being seen in *Mamillana mamilla*, while in all *Melo* species they are large. Trochiform, pupiform and bulbous protoconchs are found and form a good basis for classification.

The columellar plaits are usually consistent in number in a species but once in a while an individual may have one or possibly two extra plaits. Different genera show greater or less development of the plaits so far as solidity is concerned. The adductor muscle is small in the Volutidae so that the plaits provide a greater surface and attachment area for the muscle. Deeper-water genera usually have a correspondingly weaker system of plaits while larger and heavier shells such as *Melo* and *Cymbiola* have stronger plaits.

Genotypes and type localities are given here. Holotypes which are in the South Australian Museum are indicated by their registration numbers. Conchologists recognize three subfamilies, Volutinae, Haliinae and Aurininae, but only one subfamily, Volutinae, is represented in Australia. *Microvoluta*, genotype *Microvoluta australis* Angas 1877 from N.S.W., has been placed sometimes in the Volutidae, subfamily Volutomitrinae, but it belongs to the Mitridae. A few extra-Australian species are figured for comparative purposes. The plates reproduced here are the work of Miss B. J. F. Newman of the South Australian Museum staff.

GEOGRAPHIC AND TIME RANGE.

Recent localities are abbreviated; the initials referring to the Australian continent as a whole, e.g. N.W.A. = North Western Australia. The range of Tertiary species is indicated by the figures 1,2,3,4,5 each representing a marine stage according to the following list:

1. Werrikooian, Upper Pliocene.
2. Kalimnan, Lower Pliocene.
3. Cheltenhamian, Upper Miocene.
4. Balcombian, Middle Miocene.
5. Janjukian, Lower Miocene.

It may be noted that none of the Tertiary species mentioned occur in the Recent. Nine genera are known only from the Recent, one from the Miocene and Pliocene only, while seven range from the Lower Miocene to Recent and one each from the Middle Miocene, Upper Miocene and Lower Pliocene to Recent.

NOTES ON SOUTH AUSTRALIAN SPECIES.

Lyria mitraeformis. The animal has a dark-cream foot with violet spots. It has been taken at the following localities: Yankalilla Bay 10 fathoms, 20 fathoms, Rapid Head 9 fathoms, 12 fathoms, Eastern Cove, Kangaroo Island, alive at low tide and down to 5 fathoms, dead at 9 fathoms. American River, beach. Hardwicke Bay, large living. Investigator Straits alive in 15 fathoms, dead 20 fathoms. Banks Island 10 fathoms, 1 juvenile alive. Spencer Gulf 13 fathoms, alive. Royston Head, 22 fathoms, alive. Port Lincoln 9 fathoms, alive. Black Point 6 fathoms. Lacepede Bay. Point Sinclair abundant. Port Hughes, Kingseote, Kangaroo Island, 8 fathoms, dead. Porpoise Head, 17 fathoms, alive. Sandbanks at Outer Harbour, lowtide mark, alive. Sub-fossil on raised beaches, Murat Bay and dredged from sub-fossil deposits in the Port River.

Amorena undulata. The species is widely distributed in South Australia being found on sand banks at low tides. It has been taken at the following localities: Yankalilla Bay, 12 fathoms, American River Beach. Corny Point, 30 fathoms, alive. Backstairs Passage 16 fathoms, 20 fathoms, alive. Gulf St. Vincent 9 fathoms. Laeepede Bay. Eastern Cove, Kangaroo Island, alive at low water. Spencer Gulf 21 fathoms. Investigator Strait 17 fathoms. St. Francis Island Beach. Port Lincoln. Pondalowie Bay. Levens Beach. Goolwa. In the Great Australian Bight, 100 to 105 fathoms.

Nannamoria guntheri. This species originally described from Western Australia is typically nodulose at the shoulder, has undulate axial lines and is without the two chestnut spiral bands of *N. adcocki*. Specimens have been taken at Middleton, Encounter Bay and Corny Point 30 fathoms. The variants are as follows:

- a. The typical variant, described above, validly angled just above the sutures and in the posterior part of the body whorl. The angle is coronate with eleven plicate tubercles. The ornament consists of rather close-set, axial brown lines, angled forward at the tubercles and backward a little below the tubercles and backward again a little above the columellar plicae, and slightly forward midway between the latter two angles.
- b. There may be no axial lines whatever, the shell being of a uniform light-horn colour.

Nannamoria adcocki. This species was originally described from Middleton. It has been taken at St. Francis Island, Port MacDonnell, Robe, Royston Head, Corny Point, Vivonne Bay, Gulf St. Vincent, and also dredged in Investigator Straits 22 fathoms, Backstairs Passage 22 fathoms, Newland Head 20 fathoms, Cape Borda 55 fathoms, Point Marsden 15 fathoms. There are some variants.

- a. The shoulder is nodulose; there are two spiral brown lines of which the upper is the narrower, situated just below the angle and just above the plicae where the axials are angled backwards.
- b. The axials may be accurately interrupted along a spiral line midway between the two spiral brown lines, with more axials above the line than below.
- c. The axials may be more wavy than angled and the waves in different shells may have a very different excursion.
- d. There may be no tubercles on the shell and the angle may be quite rounded, the colour markings being still typical.

Remarks on *Nannamoria adcocki* & *N. guntheri* were published in the S.A. Naturalist 24, No. 4, p. 15 and they are included in this general review with slight adjustments.

FAMILY VOLUTIDAE.

Subfamily VOLUTINAE.

GENUS VOLUTA Linne 1758.

Voluta Linne 1758. *Syst. Nat.*, ed. 10, 729.

Genotype: *Voluta musica* Linne 1758. West Indies.

Remarks: Synonyms of the genus are *Musica* Bolten 1797, *Chlorosina* Gray 1858, *Volutolyria* Crosse 1877. The genus occurs in the West Indies and West Africa, but not in the Australian region.

GENUS LYRIA Gray 1847.

Lyria Gray 1847. *Proc. Zool. Soc. Lond.*, 141.

Genotype: *Voluta nucleus* Lamarek 1811. Tropical seas.

Remarks: *Otocheilus* Conrad 1865 is a synonym.

RECENT.

mitraeformis Lamarek 1804. S.A. (type). W.A., Viet., Tas. = *multicostata* Broderip 1827.

pattersonia Perry 1811. N.S.W. (type), Q., N.A., S. Pae.

kimberi Cotton 1932. S.A. (type) D. 10185.

deliciosa Montrouzier 1859. Q., N. Caledonia (type).

nucleus Lamarek 1844. Q. (type).

TERTIARY.

acuticostata Chapman 1920. Balecombe Bay. 4. 5.

semiacuticostata Pritchard 1896. Table Cape. 5.

GENUS HARPEOLA Dall 1907.

Harpeola Dall 1907. *Smith Misc. Coll.* 48, 350.

Genotype: *Voluta anna* Lesson 1832 = *V. costata* Swainson 1849. Moluecas.

Remarks: A synonym is *Harpella* Gray 1858; not *Harpella* Sehrank 1802 (Lepidoptera). The genotype is found in the West Indies.

TERTIARY.

harpularia Tate 1888. Muddy Creek, Lower Beds. 4, 5.

gemmata Tate 1888. Muddy Creek, Upper Beds. 2.

GENUS *TERNIVOLUTA* Von Martens 1897.

Ternivoluta von Martens 1897. *Arch. f. Naturg.* 63, 1, 177.

Genotype: *Voluta (Ternivoluta) studeri* von Martens 1897. Queensland.

RECENT.

studeri von Martens 1897. E. Aust., 36 fathoms, Q. (type).

GENUS *AUSTROVOLUTA* gen. nov.

Genotype: *Voluta antiscalaris* McCoy 1874. Fyansford, Vict.

Shell attenuated anteriorly, spire moderately acute; body whorl and spire whorls sharply angulated at the shoulder, which is set with short sharp conical spines corresponding to the sigmoid acute, spaced axial ribs; another corresponding set of short spines is situated just below the suture; axial ribs crossed by numerous spiral sulci with flat intermediate spaces; columellar plaits three or four, slender, widely separate and oblique, the posterior plait distinctly less developed than the others; outer lip thin, smooth; protoconch obtusely rounded, smooth, of one-and-a-half whorls.

Remarks: The genus ranges from the Lower Miocene to the Upper Pliocene. It is most nearly related to the European Tertiary genus *Volutospina* Newton 1906 (genotype *Conus spinosus* Linne), synonyms of which are *Plejona* Bolten (pars) 1898 and *Volutitithes* Swainson 1840, not Swainson 1831 (genotype, *Voluta muricina* Lamarek 1831). The protoconch of the European genotype *V. spinosus* is sharp and small, not swollen at the tip, consists of two or three smooth whorls and has one more whorl than in the Australian genus. This difference certainly separates the Australian genus here described. *V. anticingulata*, *V. levior*, *V. persuleata*, and *V. indivisa* may all be variants of *V. anticingulata*.

TERTIARY.

antiscalaris McCoy 1874. Fyansford, Schnapper Point, 1, 4.

levior McCoy 1874. Mount Martha, 4.

antispinosus Tate 1899. Murray Desert 3.

anticingulata McCoy 1874. Bird Rock 4, 5.

agnewi Johnston 1880. Table Cape 5.

indivisa McCoy 1874. Table Cape, 5, = *persuleata* McCoy 1876. Spring Creek 5.

GENUS *ERICUSA* Adams 1825.

Ericusa H. & A. Adams 1825. *Genera Rec. Moll.*, 2, 619.

Genotype: *Voluta papillosa* Swainson 1820. Southern Anstralia,

Remarks: The protoconch of *E. papillosa* Swainson is shorter and less oblique than that of *E. fulgetrum* though they are basically similar in form. The difference does not warrant generic separation. The genus is well represented in the Miocene. There is a species found in the "Adelaidean" (Pliocene) but no complete specimens are available for the description; it may be *E. ancilloides* Tate. *V. crassilabrum* may be a *Mitra*.

RECENT.

papillosa Swainson 1820. Loe? (type). Tas., S.A., Viet., W.A. 100 fathoms? = *papillaris* Reeve 1849, S.A. (type) = *macquariensis* Petterd 1879, W. Tas. (type).

kenyoniana Brazier 1898. N.S.W., Viet. (type), W.A. 100 fathoms?

fulgetrum Sowerby 1825. Loe.? (type) S.A., W.A., 120 m. W. of Eucla, 120 fathoms. var. *lunisligata* Verco 1912. S.A. (type); var. *punctisligata* Verco 1912. S.A. (type); var. *connectens* Verco 1912. S.A. (type); var. *bicineta* Verco 1912. S.A. (type); var. *tricineta* Verco 1912. S.A. (type); var. *unicincta* Verco 1912. S.A. (type); var. *alba* Verco 1912. S.A. (type); var. *dictua* Verco 1912. S.A. (type).

TERTIARY.

ancilloides Tate, 1889. River Murray Cliffs, 2, 3, 4, 5.

pellita Johnston, 1880. Table Cape. 4, 5.

allporti Johnston, 1880. Table Cape. 5.

ellipsoidea Tate, 1888. Muddy Creek, Lower Beds.

crassilabrum Tate, 1889. Muddy Creek, Lower Beds. 4.

fulgetroides Pritchard, 1895. Muddy Creek, Upper Beds. 2, 3.

Genus MESERICUSA Iredale, 1929.

Mesericusa Iredale, 1929. *Rec. Aust. Mus.*, 17, No. 4, 181.

Genotype: *Mesericusa sowerbyi perspecta* Iredale, 1929. New South Wales.

Remarks: *Mesericusa* has a smaller protoconch than that of *Ericusa* and the tip is exsert also the shell is narrower and differently shaped.

RECENT.

sowerbyi Kiener, 1839. S. Tas. (type). N. Tas., Viet. = *fusiformis* Angas, 1871, Tas. (type).

perspecta Iredale, 1929. N.S.W. (type).

TERTIARY.

halli Pritchard, 1896. Bird Rock, Lower Beds. 5.

Genus COTTONIA Iredale 1934.

Cottonia Iredale 1934. *S. Aust. Nat.*, 15, No. 2, 57.

Genotype: *Scaphella dannevigii* Verco 1912.

RECENT.

nodiplicata Cox 1910. W.A., Rottnest Island (type). = *dannevigii* Verco 1912.

W.A. 90 miles west of Eucla, 105–77 fathoms (type).

TERTIARY.

heptagonalis Tate 1889. Murray Cliffs, Morgan. 4.

validicostata Dennant & Kitson 1903. *nom. mut.* = *atticostata* Tate 1889,

Muddy Creek, Lower Beds. 3, 4, 5. (preocc.).

atkinsoni Pritchard 1896. Table Cape. 5.

spenceri Pritchard 1896. Table Cape. 5.

Genus PTEROSPIRA Harris 1897.

Pterospira Harris 1897. *Cat. Tert. Moll. Brit. Mus.*, pt. 1, 100.

Genotype: *Voluta hannafordi* McCoy 1874. Muddy Creek.

Remarks: This genus seems closely allied to *Cottonia* judging from protoconch features and even adult shell characters.

RECENT.

roadnightae McCoy 1881. Viet. (type). S.A.

TERTIARY.

hannafordi McCoy 1874. Fyansford. 3, 4, 5.

galliffi Pritchard 1898. Muddy Creek, Lower Beds. 4.

stephensis Johnston 1880. Table Cape. 5.

wynyardensis Pritchard 1913. Table Cape. 5.

mortoni Tate 1889. Muddy Creek, Lower Beds. 4, 5.

macroptera McCoy 1874. Bird Rock, Geelong. 5.

Genus MAMILLANA Crosse 1871.

Mamillana Crosse 1871. *Journ. de Conch.*, 2, ser. 3, 308.

Genotype: *Voluta mamilla* Gray 1859.

Remarks: The protoconch is exceptionally large and bulbous in this genus. According to Mr. O. Singleton (verbal communication) there is a fossil specimen from Jemmy's Point in the Cudmore collection, closely allied to *M. mamilla* Gray.

RECENT.

mamilla Gray 1859. N.S.W., Tas., Vict., S.A., N.A., Q.

Genus MELO Humphrey 1797.

Melo Humphrey 1797. *Mus. Calonn.*

Genotype: *Voluta diadema* Lamarek 1844. = *V. cithara* Solander 1786. = *V. amphora* Solander 1786.

Remarks: The two species of *Melo* found in Northern Australia, *M. amphorus* and *M. umbilicatus* are separated by the wide mouth, close coronation and sunken spire of the latter species. The S.W. Australian species *M. georginae*, may be slightly different from *M. mucronatus*. A photograph of a newly formed egg capsule of *Melo miltonis* attached to a piece of limestone from the reef at Ceduna, S.A., is reproduced here. Height 220 mm., width 114 mm. No vestige of the protoconch is visible at this stage, but when the embryo is fully developed and on the point of hatching the protoconch is about 26 mm. in length and 16.5 mm. in greatest width. A photograph of a capsule showing the protoconch fully developed was described and figured by the author in the Rec. S. Aust. Mus., 6, No. 1, p. 101, pl. 4, fig. 5, 6, 7, 1937. Further notes were published in the same periodical 1944, 8, No. 1, 143.

RECENT.

amphorus Solander 1786. Q. (The Boring Globe) = *flammeum* Bolten 1798, Indian Ocean. = *diadema* Tryon 1882, Indian Ocean. = *diadema* Lamarek 1844, Indian Ocean. = *cithara* Solander 1786, Indian Ocean.

umbilicatus Sowerby 1825, Q. (type) N.A. = *ducalis* Lamarek 1844, Moreton Bay, Q. (type), N.A.

mucronatus Sowerby 1855. Moreton Bay, Q. (type). N.A. = *georginae* Gray 1834. Swan River (type), S.W.A.

miltonis Gray 1834. Swan River (type). S.W.A., S.A. = *cylindratus* Broderip 1855. S.W.A. (type).

Genus CYMBIOLA Swainson 1831.

Cymbiola Swainson 1832. *Zool. Illust.*, Ser. 2, 2, pl. 19, pl. 87.

Genotype: *Voluta cymbiola* Sowerby 1847. Moluccas.

Remarks: Synonyms are *Aulica* Gray 1847, *Scapha* Gray 1847. *Vespertilio* Klein 1753. *C. scafa* and *C. tissotina* are probably nodular and smooth forms of the same species. The Tertiary species *V. hamiltonensis* included here has a rather large protoconch, and may not be congeneric. McCoy mentions two variants of *V. strophodon*, a shorter and a longer spired form.

RECENT.

- deshayesi* Reeve 1854. N.Q., N. Cal.
mariaemma Gray 1859. N.W.A. (type) = *grayi* Crosse 1871. N.W.A.
nivosa Lamarek 1844. W.A., Garden Island (type). = *oblita* Smith 1809, W.A.
norrisi Gray 1838. W.A. Depuch Island (type).
pulchra pulchra Sowerby 1825. Q. Great Barrier Reef.
pulchra wisemani Brazier 1871, N.Q. (type). N.E. Aust.
rutila rutila Broderip 1825. N.Q. (type).
rutila inexta Reeve 1849. Louisade, New Guinea.
rutila ruckeri Crosse 1867. Q., New Guinea, Solomon Islands (type).
rossiniana Bernardi 1859. N. Cal.
sophia Gray 1846. N.A. (type). Q.
tissolina Crosse 1867. N.A. (type).
flavicans Gmelin 1791. N.A., Q.
piperita Sowerby 1844. Q., New Georgia, Solomon Islands. = *macgillivrayi*
 Cox 1873. New Georgia, Solomon Islands. = *ceraunia* Crosse 1880.
imperialis Lamarek 1844. Philippines (type). N.A.?
irvinae Smith 1909. W.A. Rottneest Islands (type).
vesperlilio Linne 1766. Ind. Ocean (type), N.A.
nobilis Solander 1786. Polynesia, China, N.A. = *scapha* Gmelin 1788.
scafa Solander 1886. N.A.

TERTIARY.

- strophodon* McCoy 1876. Fyansford. 3, 4, 5.
weldii. Tenison Woods 1876. Table Cape, 2, 3, 4, 5.
stolida Johnston 1880. Table Cape. 5.
brevispira Pritchard 1913. Table Cape. 5.
intermedia Pritchard 1913. Table Cape. 5.
angustior Pritchard 1913. Table Cape. 5.
macdonaldi Tate 1888. Muddy Creek, Lower Beds. 4.
unicifera Tate 1888. River Murray Cliffs. 3, 4, 5.
hamiltonensis Pritchard 1898. Muddy Creek, Lower Beds. 4.

Genus VOLUTOCONUS Crosse 1871.

Volutoconus Crosse 1871. *Journ. de Conch.*, 19, 306.

Genotype: *Voluta coniformis* Cox 1871.

RECENT.

- coniformis* Cox 1871. N.W.A., Nichol Bay (type).
bedualli Brazier 1879. N.A. (type).

TERTIARY.

limbata Tate 1888. Blue elays, Schnapper Point. 4.

ralphi Finlay 1930 = *conoidea* Tate 1888. Muddy Creek, Lower Beds. 4
(preoee.), not Renier 1804 or Bose 1801.

Genus CYMBIOLACCA Iredale 1929.

Cymbiolacca Iredale 1929. *Rec. Aust. Mus.*, 17, No. 4, 181.

Genotype: *Cymbiola complexa* Iredale 1924.

RECENT.

complexa Iredale 1924. Q., N.S.W., N. Cal. = *punctata* Swainson 1823. Not
Allan 1818.

Genus CYMBIOLENA Iredale 1929.

Cymbiolena Iredale 1929. *Rec. Aust. Mus.*, 17, No. 6, 181.

Genotype: *Voluta magnifica* Perry.

RECENT.

magnifica Perry 1811. N.S.W. (type).

Genus CYMBIOLISTA Iredale 1929.

Cymbiolista Iredale 1929. *Rec. Aust. Mus.*, 17, No. 4, 181.

Genotype: *Voluta marmorata* Swainson 1822.

RECENT.

marmorata Swainson 1822. Q.

hunteri Iredale 1931. N.S.W. (type).

Genus NOTOPEPLUM Finlay, 1926.

Notopeplum Finlay 1926. *Trans. N.Z. Inst.*, 57, 514.

Genotype: *Scaphella victoriensis* Cossmann 1899. Viet., Muddy Creek.

Remarks: The species of this genus have a shape like *Amoria pallida* Gray
and the protoconch, too, is somewhat similar.

RECENT.

translucidum Vereo 1896. S.A. (type).

TERTIARY.

- victoriensis* Crossman 1899. 4. = *politum* Tate 1889. Muddy Creek, Lower Beds. (preoc.).
protorhysum Tate 1889. Adelaide Bore. 5.
saginum Finlay 1930. Table Cape. 5.
maccoyii Tenison Woods 1877. Table Cape. 5.
balcombensis Finlay 1930. Balcombe Bay. 4.

Genus ZEBRAMORIA Iredale, 1929.

Zembramoria Iredale 1929. *Rec. Aust. Mus.* 17, No. 4, 180.

Genotype: *Voluta zebra* Leach 1814. N.S.W., Q.

RECENT.

- zebra* Leach 1814. N.S.W., Q.
zebra dampieria Iredale 1914. N.W.A. (type).
zebra lineata Leach 1814. N.A. (type).

Genus RELEGAMORIA Iredale 1936.

Relegamoria Iredale 1936. *Rec. Aust. Mus.*, 19, No. 5, 314.

Genotype: *Retegamoria molleri* Iredale 1936. New South Wales, 85 fathoms.

RECENT.

- molleri* Iredale 1936. N.S.W., 85 fathoms (type).

Genus AMORENA Iredale, 1929.

Amorena Iredale 1929. *Rec. Aust. Mus.*, 17, No. 4, 180.

Genotype: *Voluta undulata* Lamarek 1804. Viet.

- undulata* Lamarek 1804. Viet. (type), N.S.W., S.A., Tas., W.A. = *angasi* Brazier 1876. N.S.W. (type).
kingi Cox 1871. King Island, Bass Straits (type). Tas.
slateri Cox 1869. Tas (type).
macandrewi Sowerby 1882. W.A. (type).

TERTIARY.

- masoni* Tate 1889. Muddy Creek, Upper Beds. 2.

Genus NANNAMORIA Iredale 1929.

Nannamoria Iredale 1929. *Rec. Aust. Mus.*, 17, No. 4, 181.

Genotype: *Nannamoria amicula* Iredale 1929. N.S.W., 50-60 fathoms.

Genus NANNAMORIA ABSIDATA sp. nov.

Pl. 14.

Shell ovately fusiform, rather thin, smooth, shining; protoconch broadly conical, of four smoothly flattened whorls, with an impressed suture; adult whorls three-and-a-half, moderately convex anteriorly; sculpture of curved, slender, rather angular axial costae, crowded on the posterior whorl, interspersed with very fine accremental striae; last whorl slightly ventricose posteriorly, gradually tapering anteriorly but still rather broad at the anterior end; aperture elongate, three times the length of the spire; outer lip bevelled to a thin edge, a little emarginate and ascending at the suture, almost straight medially, patulous anteriorly; canal short, opened, turned to the right, scarcely reverted; columella arcuate towards the front, with four equidistant, equal, oblique plaits.

Height 69 mm., diameter 27 mm. Protoconch, height 5 mm., diameter 5.5 mm.

Loc.: Muddy Creek, Lower Beds.

Remarks: *N. absidata* is related to *N. lirata* Johnston 1880 from Table Cape. The present species is more strongly sculptured and the protoconch has more whorls. The species was figured by Tate 1889 as *N. lirata* Johnston, from a specimen in the Tate Museum.

RECENT.

amicula Iredale 1929. N.S.W., 50-60 fathoms (type).

guntheri Smith 1886. W.A. (type). S.A.

adcocki Tate 1888. S.A. (type).

TERTIARY.

costellifera Tate 1889. Muddy Creek, Lower Beds. 4.

lirata Johnston 1880. Table Cape. 4, 5.

absidata sp. nov. Muddy Creek, Lower Beds. 4.

Genus AMORIA Gray 1855.

Amoria Gray 1855. *Proc. Zool. Soc.*, 64.

Genotype: *Voluta turneri* Gray 1834. W.A.

Remarks: The protoconch of the rare species *A. exoptanda* is of the type found in this species.

Genus AMORIA NEWMANAE sp. nov.

Pl. 13.

Shell rather small in size, fusiform, rather narrow, shoulder not angled but gently curving into the general contour of the shell, fairly solid, smooth and

polished, light cream-coloured, with close wavy, nut-brown axial lines, rather irregular, forming U-shaped loops which in places coalesce, the next line giving in some places an incomplete ringlike pattern; a few odd indistinct blotches form two broken spiral bands on the body-whorl and there is a very narrow series of more distinct but small blotches just below the suture; spine acuminate, rather sharply angled but the protoconch is small, blunt, and polished, the first whorl rather depressed, colour cream stained with brownish-violet, the adult colouration commencing rather abruptly after the first four-and-a-half whorls, aperture rather narrow, polished, light-brown coloured fading to white at the outer lip; columella plaits four, forming a fasciole at the lower portion, where they are produced unto the body whorl.

Height 66 mm., diameter 25 mm.

Loc.: North Western Australia.

Remarks: Holotype. Reg. No. D.14226, S.A. Mus. The species is probably more like *Amoria turneri* than any other species, but it has a peculiar colour pattern. It is less like *Amoria practexta* which has a tent-like decoration and wider aperture.

RECENT.

pallida pallida Gray 1834. W.A. (type) = *volva* Chemnitz.

pallida turneri Gray 1834. W.A. (type).

pallida damoni Gray 1864. W.A. (type). = *gatliffi* Sowerby 1910. N.A., Port Keats (type), not *gatliffi* Pritchard 1898, a fossil.

pallida elliotti Sowerby 1864. N.A. (type), W.A.

newmanae sp. nov. N.W.A. (type), N.A.

jamrachi Gray 1864. W.A. (type), N.A.

caroli Iredale 1924. Q. = *maculata* Swainson 1882. Not Meusehen 1781.

spenceriana Gatliff 1908. N.Q. (type).

grossi Iredale 1927. Q. (type).

canaliculata McCoy 1869. N.A., Port Denison (type).

practexta Reeve 1849. N.A. (type).

reevei Sowerby 1858. W.A.? (type). = *hedleyi* Iredale 1914. N.W.A. (type).
= *reticulata* Reeve 1843. Not Linne 1767.

exoptanda Sowerby 1849. S.A. (type), S.W.A.

TERTIARY.

macrocephala Finlay 1926. *nom. mut.* 3. = *capitata* Tate 1889. Murray Desert, Well Sinking. 3. Not *Voluta capitata* Perry 1811.

Genus NOTOVOLUTA Cotton 1946.

Notovoluta Cotton 1946. *S. Aust. Nat.*, 24, No. 1, 15.

Genotype: *Voluta kreuslerae* Angas 1865. S.A.

RECENT.

kreuslerae Angas 1865. S.A. (type).

vereonis Tate 1822. S.A. (type).

oeeidua Cotton 1946. W.A., Hopetoun, 35 fathoms (type).

thatcheri McCoy 1868. Bampton Reef, New Caledonia (type), Q. D. 14221.

rossiteri Brazier 1898. Viet. (type), D. 8322.

perplicata Hedley 1902. Q., Great Barrier Reef (type).

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tateana Johnston 1880. Table Cape. 5.

cathedralis Tate 1888. Muddy Creek, Lower Beds. 4, 5.

pagodoides Tate 1888. Aldinga, Lower Beds. 4, 5.

tabulata Tate 1888. Murray Desert, Well Sinking. 2, 3.

pseudolirata Tate 1888. Muddy Creek, Lower Beds. 4.

eribrosa Tate 1889. Aldinga, Lower Beds. 5.

lintea Tate 1889. Murray Cliffs. 3, 4.

sarissa Tate 1889. Murray Cliffs. 4.

puceblensis Pritchard 1898. Lower Beds, Bird Roek. 5.

sexuaplicata Chapman 1922. Muddy Creek, Clifton Bank. 4.

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EXPLANATION OF PLATES.

Plate xiii.

- Amoria newmanae* sp. nov. N.W.A. ($\times 0.94$).
Cymbiola tissotina Crosse 1867. N.A. ($\times 0.56$).
Amoria practecta Reeve 1849. N.A. ($\times 0.94$).
Cymbiola nobilis Solander 1786. N.A. ($\times 0.56$).
Amorena kingi Cox 1871. King Island. ($\times 0.56$).
Cymbiolacca complexa Iredale 1924. Q. ($\times 0.56$).
Cymbiola scafu Solander 1786. N.A. ($\times 0.75$).
Cymbiola vespertilio Linne 1766. N.A. ($\times 0.56$).
Cottonia nodiplicata Cox 1910. S.W.A. ($\times 0.375$).
Cymbiola wisemani Brazier 1871. N.Q. ($\times 0.75$).
Cymbiola piperita Sowerby 1825. N.Q. ($\times 0.75$).
Melo umbilicatus Sowerby 1825. N.Q. ($\times 0.19$).
Melo amphorus Solander 1786. N.Q. ($\times 0.19$).
Cymbioluca magnifica Shaw 1801. N.S.W. ($\times 0.25$).
Ericusa kenyotana Brazier 1898. Vict. ($\times 0.375$).

Plate xiv.

- Harpcola harpularia* Tate 1888. Muddy Creek, Lower Beds.
 ($\times 1.5$).
Nannamoria absidata sp. nov., ($\times 0.75$).
Ericusa ancilloides Tate 1889. Murray Cliffs. ($\times 0.75$).
Nannamoria stellifera Tate 1889. Muddy Creek, Lower Beds.
 ($\times 0.75$).
Amorena masoni Tate 1889. Muddy Creek, Upper Beds. ($\times 0.75$).
Notovoluta laticana Johnston 1880. Table Cape. ($\times 0.75$).
Notovoluta tabulata Tate 1888. Abattoirs Bore. ($\times 1.2$).
Cymbiola weldii Tenison Woods 1876. Table Cape. ($\times 1.05$).
Cottonia alticostata Tate 1889. Muddy Creek, Lower Beds.
 ($\times 0.4$).
Notovoluta pseudolirata Tate 1888. Muddy Creek, Lower Beds.
 ($\times 0.75$).
Cymbiola mcdonaldi Tate 1888. Muddy Creek, Lower Beds.
 ($\times 0.375$).
Notovoluta sarissa Tate 1889. Murray Cliffs. ($\times 0.6$).
Pterospira hannafordi McCoy 1874. Fyansford. ($\times 0.375$).
Notovoluta pugoides Tate 1888. Muddy Creek, Lower Beds.
 ($\times 0.75$).
Cottonia heptagonalis Tate 1889. Murray Cliffs, Morgan.
 ($\times 0.25$).

Plate xv.

- Austrovoluta antiscalaris* McCoy 1874. Fyansford, Schnapper Point. ($\times 1.46$).
- Notovoluta cathedralis* Tate 1887. Muddy Creek, Lower Beds. ($\times 0.825$).
- Pterospira mortoni* Tate 1889. Muddy Creek, Lower Beds. ($\times 0.75$).
- Ericusa ellipsoidea* Tate 1888. Muddy Creek, Lower Beds. ($\times 0.675$).
- Austrovoluta anticingulata* McCoy 1874. Bird Rock, Lower Beds. ($\times 1.05$).
- Mesericusa halli* Pritchard 1896. Bird Rock, Lower Beds. ($\times 0.3$).
- Notopeplum balcombensis* Finlay 1930. Muddy Creek. ($\times 0.94$).
- Notovoluta lintea* Tate 1888. Murray Cliffs. ($\times 1.9$).
- Notopeplum protorhysum* Tate 1889. Adelaide Bore. ($\times 0.97$).
- Pterospira macroptera* McCoy 1874. Bird Rock, Geelong. ($\times 0.32$).
- Volutoconus limbata* Tate 1888. Blue clays, Schnapper Point. ($\times 1.57$).
- Austrovoluta antispinosus* Tate 1899. Murray Desert. ($\times 0.75$).
- Cymbiola strophodon* McCoy 1876. Fyansford. ($\times 1.4$).
- Ericusa crassilabrum* Tate 1888. Muddy Creek, Lower Beds. ($\times 5.4$).
- Volutoconus ralphi* Finlay 1930. Muddy Creek, Lower Beds. ($\times 1.3$).

Plate xvi.

- Newly-laid egg-capsule of *Melo miltonis* Gray, attached to a piece of reef limestone. Ceduna, S.A. ($\times 0.7$).